PEER REVIEW HISTORY

ARTICLE DETAILS

TITLE (PROVISIONAL)	Firearm injury epidemiology in children and youth in Ontario, Canada: a population-based study.
AUTHORS	Saunders, Natasha; Moore Hepburn, Charlotte; Huang, Anjie; de Oliveira, Claire; Strauss, Rachel; Fiksenbaum, Lisa; Pageau, Paul; Liu, Ning; Gomez, David; Macpherson, Alison

VERSION 1 – REVIEW

REVIEWER	Tseng, Joshua Cedars-Sinai Medical Center, Surgery
REVIEW RETURNED	09-Jun-2021

GENERAL COMMENTS	Saunders et al presents an original study of firearm injury epidemiology in Ontario, Canada. Subjects residing in Ontario, Canada from 2003 to 2018, ages birth-24 years were included to the study. They classified subjects based on firearm injury intent and weapon type, including both powder-based and non-powder-based firearms. They found that the majority of firearm injuries occurred in males, and the majority of injuries were unintentional. The majority of injuries were also secondary to non-powdered firearms. Adjusted regression models showed that males were at increased risk of injury. When comparing powdered to non-powdered firearms, non-powdered firearms had a higher risk of causing unintentional injuries but not assault. Comments: Methods: The extent of the two databases (“administrative” and “health”) is unclear. Do they capture 100% of all hospitalizations in the province? If datasets are linked through identification numbers with provincial health insurance, are there any populations that this methodology would exclude? Methods: Page 12 Line 21: Do non-powdered firearms in your study include those with muzzle velocities >152.4 m/s? You explained differences in definitions of firearms but did not clarify what is actually captured in your study. Also, in the discussion, you use feet/second instead of m/s. Page 8 line 13: “Children and youth are particularly vulnerable to firearm injury as it is a period in their lives where they have increasing independence and access to firearms yet still immature executive functioning.” – would benefit from better wording/grammar Page 9 line 15: should be e.g. instead of i.e. Page 9 line 25: sociocultural environment, drivers, AND normative

	behaviours Page 9 line 32: sequalae is misspelled Page 26 line 45: there is an extra "-" in the cells Page 28 line 26: should be self-harm not selfharm Overall: The manuscript is well-written and interesting. The main criticism I have for this study is the mixture of non-powdered firearms with powdered firearms in the analysis and the discussion. I am probably biased by virtue of growing up in a country where BB, paintball and airsoft guns are marketed as toys, not lethal weapons. My strong recommendation is to report them as completely separate entities. I would separate out powdered and non-powdered firearm data in tables 1 and 2, results, and discussion section. This would make the data more enlightening, and it would be easier to compare your findings to other studies. Readers would also better understand the injury profile of powdered and non-powdered weapons. Furthermore, I would not compare the rate ratio of "firearm injuries" between BB vs. handguns (as you did in Table 4 and the discussion), as a firearm injury from a handgun is probably more severe than a firearm injury from a BB pellet - but we would not know unless you separated out them out in Table 2.

REVIEWER	Flaherty, Michael Injury Free Coalition for Kids of Boston
REVIEW RETURNED	01-Sep-2021

GENERAL COMMENTS	Thank you for allowing me to review this important contribution to the literature. To date, this appears to be the largest epidemiological of firearm injuries in the pediatric population in Canada. While many of the findings appear to be common sense and expected, this is important as until now, much of this was assumed or anecdotal. As the US and others struggle with firearm-related injuries, high quality epidemiological data from other countries is necessary to figure out what is being done differently. The major limitation of the study is the large number of missing data - a problem inherent in many longitudinal data sets, especially linked health records. I would make a stronger explanation of this in the limitations section - additionally, some of the conclusions such as 2/3 and other definitive numbers may be over or under-stated based on the large numbers of missing intent and weapon types and should be worded differently. line 30: "Here, we use the terms youth, young people, and emerging adults interchangeably. " - Appreciate the clarification, but would pick one and stick with it uniformly throughout.

VERSION 1 – AUTHOR RESPONSE

Reviewer: 1

Methods: The extent of the two databases ("administrative" and "health") is unclear. Do they capture

100% of all hospitalizations in the province? If datasets are linked through identification numbers with provincial health insurance, are there any populations that this methodology would exclude?

RESPONSE: There were more than two databases in the study (see Data Sources section). For clarity on which datasets and elements were used, we added (to the appendix) a table of data sources and data elements. The Canadian Institutes for Health Information Discharge Abstract Database (hospitalization data) captures all hospitalization for the province. Data linkage to the health insurance registry over the study years is excellent, ranging from 97.3-98.0% for all hospitalizations (not those just related to firearm injuries). Populations not included in this study are non-Ontario residents as they do not have a linkable provincial health insurance number. In the "Study Design" section, we have written, "Datasets are linked through encoded unique health identification numbers **for all persons with provincial health insurance**".

Methods: Page 12 Line 21: Do non-powdered firearms in your study include those with muzzle velocities >152.4 m/s? You explained differences in definitions of firearms but did not clarify what is actually captured in your study.

RESPONSE: Non-powdered firearms are air guns (BB, pellet guns) that use air (pneumatic system), spring (spring-air), or gas (CO2/nitrogen) to generate a projectile, which is how this group was defined in our study. According to the Firearms Act, air guns with a high muzzle velocity (>152.4 m/s) and high muzzle energy (>5.7 joules) are classified as firearms for the purposes of the Firearms Act and are subject to the same licence and registration requirements as a 'conventional firearm'. In our study, these were still included as non-powdered firearms. For clarity, in our 'Outcomes' section, we wrote, "We included non-powdered firearms based on their mechanism of generating a projectile, not on the velocity or energy of the projectile."

Also, in the discussion, you use feet/second instead of m/s.

RESPONSE: This has been modified to metres per second.

Page 8 line 13: "Children and youth are particularly vulnerable to firearm injury as it is a period in their lives where they have increasing independence and access to firearms yet still immature executive functioning." – would benefit from better wording/grammar

RESPONSE: This has been revised to, "Children and youth are particularly vulnerable to firearm injury. It is a period in their lives where they have increasing independence, immature executive functioning, and potential access to firearms"

Page 9 line 15: should be e.g. instead of i.e.

RESPONSE: This has been modified.

Page 9 line 25: sociocultural environment, drivers, AND normative behaviours

RESPONSE: This has been added.

Page 9 line 32: sequalae is misspelled

RESPONSE: This has been changed to sequelae.

Page 26 line 45: there is an extra "-" in the cells

RESPONSE: This has been removed.

Page 28 line 26: should be self-harm not selfharm

RESPONSE: This has been modified.

Overall: The manuscript is well-written and interesting. The main criticism I have for this study is the mixture of non-powdered firearms with powdered firearms in the analysis and the discussion. I am

probably biased by virtue of growing up in a country where BB, paintball and airsoft guns are marketed as toys, not lethal weapons. My strong recommendation is to report them as completely separate entities. I would separate out powdered and non-powdered firearm data in tables 1 and 2, results, and discussion section. This would make the data more enlightening, and it would be easier to compare your findings to other studies. Readers would also better understand the injury profile of powdered and non-powdered weapons.

RESPONSE: We recognize that in a jurisdiction where BB and air guns are marketed as toys, it may be important to separate out injuries caused by powdered vs. non-powdered firearms. However, we feel it is incredibly important to show the magnitude of all of these injuries from all types of firearms as they are frequent and all lead to serious injury requiring a visit to hospital (as shown in Table 2, only a minority cause a contusion). The definition of what constitutes a firearm based on federal regulations varies by jurisdiction. For example, in Australia, air handguns are categorized with other handguns and air rifles are grouped with the same restrictions as rimfire rifles and shotguns. These categories are independent of the muzzle velocity or projectile mechanism.

Our Table 1 already breaks down the lethality of the injury by weapon type and Table 3 breaks down the firearm intent and weapon type by sociodemographic factors (age, sex, income quintile, and rurality). To add to this, we have added 5 columns to our Table 2 which now break down the place of injury, nature of injury, and type of injury by weapon type. To reinforce the point about the serious nature of non-powdered firearms, one can see that there are eight times as many traumatic brain injuries from non-powdered firearms as there are from handguns.

Furthermore, I would not compare the rate ratio of "firearm injuries" between BB vs. handguns (as you did in Table 4 and the discussion), as a firearm injury from a handgun is probably more severe than a firearm injury from a BB pellet - but we would not know unless you separated out them out in Table 2.

RESPONSE: Please see our response above. We have added to Table 2 the nature, type, and place of injury by weapon type. Further, these injuries all require visit to acute care (emergency room or hospitalization) and are thus all 'severe' or 'near misses'. Table 2 shows the magnitude of the type of injuries caused by non-powdered firearms. Thus, we feel these comparisons are warranted and bring attention to this important issue.

Reviewer: 2

The major limitation of the study is the large number of missing data - a problem inherent in many longitudinal data sets, especially linked health records. I would make a stronger explanation of this in the limitations section - additionally, some of the conclusions such as 2/3 and other definitive numbers may be over or under-stated based on the large numbers of missing intent and weapon types and should be worded differently.

RESPONSE: We have added to the Limitations section, "Further, because of there was a high degree of missingness for the weapon type, the proportional contribution of each weapon type may be over or underestimated."

The number of missing intent was only 6.4% of all injuries. Thus, we have changed this to say "**Where the intent was known, approximately** two-thirds were unintentional…" The remainder of the conclusion does not state any specific numbers except to say that injuries from non-powdered firearms are 'concerningly high and assaults and self-injury contributed to substantial firearm-related deaths…"

line 30: "Here, we use the terms youth, young people, and emerging adults interchangeably. " - Appreciate the clarification, but would pick one and stick with it uniformly throughout.

RESPONSE: This has been modified to say 'youth' throughout.

Editor(s)' Comments to Author (if any):

Please revise the title of your manuscript to include the research question, study design and setting. This is the preferred format of the journal.

RESPONSE: The title has been revised to: Firearm injury epidemiology in children and youth in Ontario, Canada: a population-based study.

Please revise the 'Strengths and limitations' section of your manuscript (after the abstract). This section should contain up to five short bullet points, no longer than one sentence each, that relate specifically to the methods. The aims or results of the study should not be summarised here.

RESPONSE:
This has been revised to:

Strengths of This Study

- This is a large population-based study with almost complete provincial coverage of children and youth.
- Beyond measuring injury intent, this study measures the weapon type that caused the firearm injury.
- Both in and out of hospital deaths, all hospitalizations, and all emergency department visits for firearm injuries in Ontario were captured in available data.
- This study distinguishes the type and nature of injuries caused by various firearms, demonstrating the severity of injuries by weapon type and intent.

Limitations of This Study

- While data used have validated codes for intent and weapon type, we do not report data on perpetrators and have limited data on the circumstances surrounding the injury.

VERSION 2 – REVIEW

REVIEWER	Flaherty, Michael Injury Free Coalition for Kids of Boston
REVIEW RETURNED	28-Sep-2021

GENERAL COMMENTS	Overall, all concerns have been addressed. This study adds valuable data to the growing global health issue of firearm-related injuries.